MOVING FORWARD

A Preliminary Discussion of Technology and Transformation in California Higher Education

CALIFORNIA POSTSECONDARY EDUCATION COMMISSION

Summary

Beginning in 1996, the California Postsecondary Education Commission is undertaking a two-year project to develop recommendations for the use of technology in higher education This current work is based upon various legislative mandates and many of the conclusions and recommendations contained in two prior major Commission reports completed in 1995 *The Challenge of the Century. Planning for Enrollment and Improved Outcomes in California Higher Education*, and *A Capacity for Growth: Enrollments, Resources, and Facilities for California Higher Education, 1993-94 to 2005-06.*

This report, which was presented to the Commission at its meeting in April, 1996, marks the initial phase of the Commission's new work on technology and higher education In it, staff has outlined the context in which present educational technology initiatives are being initiated The report also discusses the potential "transformation" of higher education's operation with respect to technology, and examines some of the claims that technology may produce large future cost savings in higher education

Encompassed here are a number of major national and regional initiatives that have recently been put forward to create a "virtual university," and to establish larger networks and collaborations utilizing technology among and between higher education entities in western states Also discussed are numerous California initiatives and recent legislative activities concerning technology in higher education
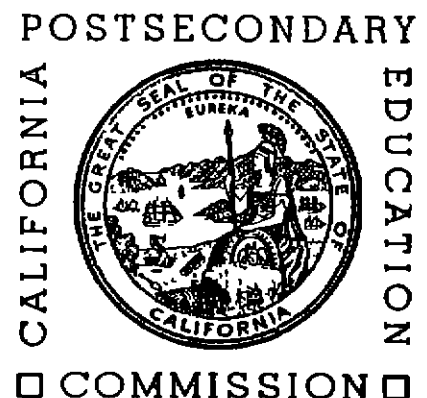
Later in 1996, staff will present the second part of this report series that will provide an overview of the segmental activities in the area of technology In 1997, following comprehensive consultation with all interested parties, the expects to put forward final recommendations on technology in California higher education

Further information about this report and the Commission's work in this area may be obtained from William L Storey or Stacy Wilson To order copies of this report (96-6) or other materials, write the California Postsecondary Education Commission (CPEC) at 1303 J Street, Suite 500, Sacramento, California 95814-2838, or telephone (916) 445-7933

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POSTSECONDARY

CALIFORNIA

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Displays

1 Introduction

In 1989, the Legislature approved Senate Bill 1202 (Hart), which directed the California Postsecondary Education Commission to develop a State policy on the subject of "distance learning" (Appendix A) Section 66947 of the Education Code defines distance learning as

> instruction in which the student and instructor are separated by distance and interact through the assistance of computer and communications technology Distance learning also may include video or audio instruction in which the primary mode of communication between student and instructor is through a communications medium, including, but not limited to, instructional television, video, or telecourses, and any other instruction that relies on computer or communications technology to reach students at distant locations

"The Commission was further directed to develop a body of research on the subject concerning both the cost effectiveness and educational soundness of distance learning programs "

Section 66940 of this legislation specifically directed the Commission to

> develop a state policy on the use of distance learning technology in education, to be considered and, if appropriate, adopted by the Legislature

The Commission was further directed to develop a body of research on the subject concerning both the cost effectiveness and educational soundness of distance learning programs There were further provisions dealing with the establishment of an advisory committee, and the need to consult widely with various educational institutions and organizations

In April of 1991, the Commission responded to the Legislature's charge with a report entitled *State Policy on Technology for Distance Learning,* in which it suggested a seven point, statewide distance learning policy that emphasized equity, quality, diversity, efficiency, and accountability in the delivery of distance education courses and programs It also urged a coordinated approach among the providers, a general expansion of distance learning opportunities throughout the state, and the adoption of a detailed policy statement in statute Other recommendations included incentive

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funding for distance learning projects, the establishment of a secure funding base for a technology infrastructure, and the creation of a permanent advisory committee Due in large part to the funding crises of the early 1990s, however, none of these recommendations was enacted by the Legislature

Since that time, the Commission has been confronted with numerous issues and dilemmas relating to the provision of expanded educational services, enrollment growth, capacity shortages, and seemingly unending resource restrictions These issues, and others related to them -- educational quality, student financial aid, remedial education, diversity -- almost invariably have implications for technology and distance learning, but it has become increasingly evident over the past two years that the planning issues are so large that focusing solely on technology and distance learning alone may not produce the most useful results

It was because of that perception that the Commission published *The Challenge of the Century* (CPEC, 1995a), followed a few months later by *A Capacity for Growth* (CPEC, 1995b) Both of these reports have implications for technology in general and distance learning in particular, but their scope is such that a wider range of issues can be considered Those issues, of course, deal with California's dilemma of finding a way to educate an additional 450,000 students over the next 10 years without the requisite resources, at least by traditional funding formulas

That concern leads immediately into issues of "productivity and efficiency " Under that heading, the Commission's most recent work plan called for a major initiative in the educational technology area -- one that will produce three reports in the next two years, of which this document is the first The principle purpose of these reports is to provide educators and policy makers with an independent assessment and evaluation of technology usage in California's public colleges and universities By doing so, the Commission has expanded the agenda from the more narrow consideration of distance learning to an overview of all the issues surrounding technology's impact on higher education

That scope is undoubtedly appropriate, since in California and throughout the nation, traditional learning and teaching paradigms are being challenged and transformed by the revolution in digital electronics, and by recent research in the cognitive and behavioral sciences regarding knowledge construction, development, and use It is anticipated that the Information Age, which is discussed at some length in this report, will be marked by a multifaceted telecommunications infrastructure in which the nation's classrooms, administrative and faculty offices, libraries, and residential

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dwellings will be electronically connected using standardized protocols for deployment of audio and video data Learning is expected to be student-centered, which means that the student, by and large, will be able to determine when, where, and how learning occurs, and to a degree, even its cost

It is also expected that learning teams will augment traditional teaching *modus operandi* These design or learning teams will be comprised of students, faculty subject matter experts, learning technology experts, graphic designers, computer hardware and software experts, and video engineers and producers (Barr and Tagg, 1995) If such a shift in organizational approach can be brought about, it will change the way higher education does business for decades to come, and may as well permit the coming tidal wave of students to receive the educational skills that both they, and California society, will need for a productive future

"However, no statewide technology plan presently exists that connects the myriad initiatives -- undertaken or planned -- to statewide priorities and objectives "

In both the western region and the nation as a whole, evidence of this changing paradigm is accumulating, and there is further evidence of collaboration and cooperative planning Examples include efforts by California's three public systems of higher education, the Western Interstate Commission for Higher Education (WICHE), the State Higher Education Executive Officers (SHEEO), the Western Governors' Association (WGA), and EDUCOM These collaborative efforts have led to the development of important principles and strategies to assist state policy makers However, no statewide technology plan presently exists that connects the myriad initiatives -- undertaken or planned -- to statewide priorities and objectives

In late summer or early fall, the Commission will present the second report That report will detail the efforts of each of the three systems of public higher education to develop a technology infrastructure, to expand opportunities for distributed learning, and to pursue other initiatives to enhance quality, improve access, and increase productivity It will also consider cognitive issues, and will endeavor to answer the question of how effective various technological applications may enhance learning As this second report is developed, the Commission will convene an advisory group to provide guidance as the process moves forward Ultimately, the Commission's third report, which will be completed next year, will offer specific conclusions and recommendations to the Governor, the Legislature, and the postsecondary sectors regarding their technological and organizational future These recommendations may cover such subjects as the collaborative uses of networks, the costs of technological renovations and upgrades, and the most likely areas in which distributed learning can be both pedagogically and financially sound

The Commission's analysis over the next two years will be directed to identifying any changes that may be needed, where they should occur, and why certain directions may be important. This first of three reports is intended to set the stage for that effort, and has at least two purposes 1) to provide a summary of national, regional, and interstate technology initiatives having an impact on, or proposed for, California postsecondary institutions, and 2) to organize the information and literature by thematic issues so that it can be useful in future planning

In summary, probably the most important question will not be "How will technology change our lives?" but rather "How can we use technology to create an educationally richer, but operationally less costly, environment?" This fundamental issue is particularly pertinent to postsecondary education as educators and policy makers contemplate the ways in which technology might help improve learner outcomes

2   The Call For Transformation

In many respects, the technological society of the future is already upon us California's global economy is increasingly becoming knowledge-based, where all workers in every sector are expected to possess the technical and analytical capacity to reason, make informed judgments, and solve problems of varying complexity The manner in which workers collaborate and communicate is becoming richer and less tied to location and occupational rank In response to changing work force needs, and in order to expand access and learning, higher education institutions are beginning to consider a fundamental restructuring of the ways in which they provide instruction, research, and public service There is, however, much debate and discussion over the nature and desired extent of all proposed changes, and little consensus has emerged to date

Some educators and officials posit that the present system simply needs to be managed better and perhaps modified somewhat in order to take advantage of emerging technologies, and to serve non-traditional students more effectively Others advocate shifting to a completely different paradigm rather than making piecemeal changes within the present system Proponents of this latter view argue that traditional, classroom-based institutions were developed to serve a young, residential, and full-time student population that is quite different from most of today's students who are older, established with families, and employed A new system is needed now, they argue, that will offer learning opportunities and instruction at almost any time, delivered without regard to location, and through a variety of formats determined by individual needs and learning styles

Among the most widely followed of those who advocate a new order are Michael Dolence and Donald Norris, who recently co-authored *Transforming Higher Education A Vision for Learning in the 21st Century* (Dolence, 1995) They stated their vision as follows

> Society is undergoing a fundamental transformation from the Industrial Age to the Information Age This is a global phenomenon with very significant local implications All people, organizations, societies, and nations are affected, although not at the same pace or to the same degree Those who realign their practices most effectively to Information

Age standards will reap substantial benefits   Those who do not will be replaced or diminished by more nimble competitors (p 2)

The key to this statement is the belief that the realignment of practice is far more important than the application of technology alone   The key to greater efficiency and economy does not lie in applying technological answers to existing procedures, it lies in inventing entirely new procedures that technology is making possible for the first time

Accommodating future needs

In *A Capacity for Growth* (CPEC, 1995), the Commission concluded that there is "no combination of practical possibilities that would produce savings or revenue sufficient to satisfy the total (capital outlay) need" produced by the coming enrollment surge known generally as "Tidal Wave II " Dolence and Norris appear to agree, and add that the resource dilemma California faces is very similar to the dilemma faced by a great many other states across the country Further, it is possible that the size of Tidal Wave II, which in California is projected to add some 455,000 new students to higher education between fall 1993 and the fall of 2005, has been underestimated

The Commission's existing projection -- and all other official projections -- are predicated on four primary pieces of information population projections, number of high school graduates, and continuation and postsecondary graduation rates However, the above-noted consultants believe that the need for retraining and continuing education -- "perpetual learning" -- is growing so rapidly that there may be as many as five million more students in postsecondary education by the year 2000 than predicted by the National Center for Education Statistics (NCES, 1995)   If California received its proportionate share of such an increase, then even the Commission's projections would be on the conservative side, possibly by a wide margin

Numerous analysts and forecasters have suggested that most future workers will need to be retrained, retooled, or in some cases completely reeducated, as many as five to 10 times in their working careers   Such a prospect could dramatically increase the need for postsecondary services, and quite probably create needs for both curricular specificity and flexibility that do not fit well with current educational delivery systems   To be sure, such a demand projection would generate an even greater gap between facilities, programs, and resources than is currently anticipated, and the Commission has already indicated that it can find no way to meet even the more modest projection of need

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To those who think technology will close this gap, Dolence and Norris offer little encouragement

> Electronic classrooms, information networks to augment classroom instruction, distance learning, continuing education, and contract learning are examples of higher education's commitment to extended education Interactive, multi-media systems are growing in use Some institutions are offering on-line learning -- University of Phoenix, OnLine University, Magellan University, National Technological University, and the Virtual University, for example However, these are only transitional efforts, not transformational The basic metaphors for instruction have remained fundamentally unchanged in most settings Technology has been used to improve their efficiency, not transform them If higher education is to play the major role in the learning franchise for the Information Age, a genuinely transformative vision is a necessity (p 10)

Transformation, and not just transition or the superimposition of technological applications, involves new ways of both thought and behavior, and neither will come easily

Information age characteristics

If the "Information Age" is the name most often given to the social and economic organism that is to replace the "Industrial Age," then the computerized network will represent its central nervous system The Internet and hundreds of other networks are changing the way people perceive reality, just as the assembly line and bureaucratic organizations changed the way people behaved and lived during the Industrial Age that is now winding down Dolence and Norris believe that almost every aspect of life, certainly including education, will be changed by this one fact, and they constructed a matrix to illustrate it, which is shown in Display 1

It is abundantly clear that many of the characteristics of the Information Age have already been adopted by corporate America, and there is increasing evidence that the health care industry is adopting similar measures that are producing highly flexible organizations characterized far more by their intellectual assets than their physical ones Further, both in health care and business, there is a growing movement to create learning infrastructures to serve highly customized needs Many large corporations already maintain their own "universities," which may increasingly become competitors with traditional public institutions for students, particularly if tuition and fee levels in the public sector continue to escalate at double-digit rates

Display 1   A Basic Description of the Differences Between the
Industrial and Information Ages

	Industrial Age	**Information Age**
Nature of Jobs	Tightly defined positions within an organization	Knowledge workers who are mobile
Nature of Organization	Rigid, formula-driven	Fast, fluid, flexible
Source of Organizational Value	Physical assets	Intellectual assets, group-centered knowledge
Pattern of Learning	Time out for training	Fusion of work and learning
Competitive Advantage for Education	Virtually exclusive teaching franchise Clustering of instructional resources is a major competitive advantage	Network scholarship, the measurement of competence, and certification of outcomes establish competitive advantage
Defining Educational Roles	Provider	Facilitator, knowledge navigator, and learner/ service intermediary

Source Dolence and Norris, 1995, p 30

In another matrix, shown in Display 2, Dolence and Norris provide a more specific look at the ways in which the information age may affect education Immediately obvious from this array is that the new paradigm is not just about technology, but about structural reform, it is equally clear, however, that those reforms cannot succeed without technology This is a primary point in *Transforming Higher Education* As the authors note

> Current technology systems in higher education are totally inadequate to the needs of knowledge navigating learners in the Information Age   On many campuses, the basic network infrastructure is in place to take advantage of the information superhighway and to accept new advances, such as wireless

connections But by tomorrow's standards, today's academic and administrative software, enabling systems software, and learning-ware are inadequate both in concept and implementation (p 38)

DISPLAY 2   *Changing Metaphors for Learning Organizations*

Industrial Age	**Information Age**
Classrooms, libraries, and laboratories	Networks
Teaching	Learning
Seat time-based education	Achievement-based learning
Classroom-centered instruction	Network learning
Information acquisition	Knowledge navigation
Distance education	Distance-free learning
Continuing education	Perpetual learning
Time out for learning	Fusion of learning and work
Separation of learners and learning systems	Fusion of learning systems

Source Dolence and Norris, p 46

To many, this may not be comforting news, for it suggests not only that technology will not be a short-run solution to the dilemma of limited resources and strong enrollment pressures, but also that the advent of technology may actually increase costs throughout education before any savings can be realized To be sure, many see electronic networks as a way to deliver education far more massively than in the past, but for that to occur, the networks themselves will have to become far more ubiquitous than they are at the present time Education remains very far from the day when everyone will have the potential to be connected to nearly universal educational opportunities at a reasonable cost, even though almost all forecasters believe that ubiquitous networking is inevitable For that to occur, however, there will have to be major infrastructure expenditures to expand telecommunications capacity, or "bandwidth" as it is now commonly called

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Yet even that will not be sufficient, since the existence of a telecommunications capacity alone does not guarantee that there will be anything useful to transmit Dolence and Norris are convinced that the mere transmission of the lecture format, the "talking head" at the front of the room, will represent only a waste of scarce resources In its place, there is a growing need for new learning applications that will involve unimaginable graphical capabilities, interactive multimedia software packages, smart cards, electronic information kiosks, highly customized learning packages, much more sophisticated e-mail systems, on-line advising, and even point-of-access payment for specific academic products (courses, seminars, workshops, research products, conference materials, etc) These, and many other elements of an electronic age whose terminology is still foreign to the ears of many, will become reality soon enough, but only with a sizable investment in networking, computing, and software development

In California, some of that investment is taking place now, and will be greatly aided by the $975 million in higher education capital outlay funding provided by the recently approved Proposition 203 Within the funding priorities of California's public systems, telecommunications infrastructure projects are much in evidence, but it is clear that more will be needed before the level of interconnections envisioned by Dolence, Norris, and others is achieved

All this may appear to be quite admirable, but for those who see technology as a primary way of reducing costs in higher education, the reality of at least short-run cost increases may be disturbing "If technology is not going to save us money," some may ask, "then why are we making these investments in infrastructure and computers?"

Productivity and efficiency

The most straightforward answer to that question is that higher education has little choice if it is to remain relevant in the 21st century Most analysts believe that technology, or at least the combination of technology and the operational reforms discussed above, will produce long-run savings But even if they do not, both students and the corporate world will insist that college graduates of the future bring with them a comprehensive technological literacy that will permit them to function comfortably in a world of powerful computers, ubiquitous networks, and highly sophisticated software packages

In such a world, technology will become embedded in the teaching process just as it is becoming integral to everything people do in virtually all walks of life, and as faculty and students become more comfortable with its myriad

uses, it is highly likely that efficiencies and productivity increases will result Unfortunately for the near future, there is a learning curve that must be scaled and a period of retraining and reorientation to new realities that will require time and investment before results appear

There is a general consensus that American business has experienced a very significant increase in productivity over the past 10 to 15 years, and many have attributed that increase to the introduction of everything from cellular phones to computers to robots Others have suggested that the productivity increases have been only indirectly related to technology, or not related at all A strong case can be made that the real reasons for the productivity gains are that businesses of every description have undergone a radical restructuring of their operations -- a restructuring that has involved the pruning of unprofitable lines of endeavor (and the massive elimination of jobs in the process), and the introduction of Total Quality Management (TQM) reforms with their emphasis on production and service quality, "just-in-time" supplying, flatter management structures, comprehensive employee training, and performance-oriented reward systems (bonuses, profit-sharing, stock purchase plans, etc)

"Whatever the reasons for increasing productivity in the corporate sector, there is general agreement that there has not been a similar increase in productivity in education.. "

Whatever the reasons for increasing productivity in the corporate sector, there is general agreement that there has not been a similar increase in productivity in education, even in those areas of education such as administration, where the introduction of computers led many to believe that productivity improvements could be expected   Paul Attewell of the City University of New York believes that the reason for this may be that the credit given to technology in almost all areas is misplaced

James Mingle, Executive Director of the State Higher Education Executive Officers (SHEEO), offers a related observation

> It is not at all clear whether technology is part of the cost problem in higher education or part of the solution   Technology costs, primarily in infrastructure (such as wiring and switching technology) and end-user equipment (servers, workstations, computers, monitors) are consuming larger and larger portions of institutional budgets   In addition to these expenses are personnel costs in the computer center and in instructional technology units, which proliferate from the campus to the college to the departmental level Facilities to produce high quality video courses and the costs of instructional design teams can be major expenditures   Then there are licensing fees for software, ever-shorter life cycles on equipment, and line charges to pay the telecommunications carriers   To date, much of this technology enhancement has been "bolted on"

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an organizational structure, especially on the academic side, which is fundamentally unchanged (Mingle, 1995)

The evidence is strong that this "bolting on" does not make people more efficient, it simply allows people to do more things than they were able to do previously. For example, instead of simply writing a letter or a report on a typewriter, word processors permit writers to compose more words in less time, with much greater typographical accuracy (spell checkers), to integrate text and graphics, as well as greatly improve overall appearance which can be enhanced further -- at some sacrifice of time -- by desktop publishing programs. Further, when electronic spreadsheets replaced manual calculations, the possibilities for refining and presenting data became almost endless, with consequent increases in the time employees spend creating them

A "re-engineered" educational environment

Higher education will not become more efficient and productive simply by purchasing more hardware and software. Rather, it will be the application of technology to a transformed working environment that will make the difference, an environment that, as they say, will be "realigned, redesigned, redefined, and re-engineered." In the instructional area -- the heart of the enterprise -- that will involve the creation of entirely new kinds of jobs, those of "synthesizer," "mentor," "certifier of mastery," "architect," and "navigator."

Whether these or other terms eventually take hold is beside the point, the point is that higher education will eventually experience a greater degree of specialization than in the previous paradigm. Where all faculty today are expected to be teachers, researchers, and public servants, more specialized roles will emerge in the future, with many only teaching, some doing only research, others becoming "architects" for the design of new curricula and "learning-ware." And as this specialization intensifies, there will be a greater need for technicians who understand the technology, who can work with faculty to develop videos and CD-ROMS, facilitate the use of networks, and who can maintain all of the infrastructure that will be crucial to institutional operation

Among those who are becoming increasingly convinced that this is the future is the National Center for Higher Education Management Systems (NCHEMS) in Denver. In a recent report summary, the Center noted

> Probably the most frequent claim associated with technology-based instruction is that substantial efficiencies can be realized without loss of effectiveness. What we have observed suggests that this

remains a real long-run possibility Tempering this positive finding, though, is the fact that initial implementation costs are substantial and in the short run tend to completely offset any savings realized (NCHEMS, 1996)

Perhaps because change is so difficult, and at the same time nearly inevitable, Dolence and Norris tend to wax and wane between optimism and pessimism over the changes they see as utterly essential to higher education's future health At one point, they charge that

> There is no question that higher education is an "industry" in denial Despite repeated warnings that higher education must show increases in productivity corresponding to those shown in other sectors of the economy in order to continue to warrant support, academe resists (p 81)

Yet through this resistance, the overall tenor of their report is optimistic, if simultaneously aggressively challenging One reviewer of *Transforming Higher Education* so noted

> Some readers may question the authors' striking optimism Dolence and Norris hypothesize that, "The Information Age is an epoch where higher education could occupy *the* [their italics] pivotal role in society" There are almost no down sides, drawbacks or losses in their enthusiastic outlook (Connick)

Cognition and technology
The past 20 years have witnessed an expanding body of theoretical and empirical research in the cognitive and behavioral sciences regarding student perception, thinking, and mastery learning. There also appears to be a rapprochement between cognitive research and a willingness among higher education's faculty to adapt and apply the research to teaching and instruction for more effective student outcomes

A growing number of educators now recognize that knowledge is not necessarily acquired by delivering declarative or factual information through lecture-based instruction, rather, it is constructed by the learner through a complex sequence of mental and behavioral processes directed toward meaning, interpretation, problem-solving, and synthesis These may include abstracting and encoding crucial features of a problem situation, constructing a mental image of the problem in short-term memory that represents the appropriate relationships among the problem's components, selecting the optimal problem strategy, and undertaking a wide range of behavioral learning tasks so that the recently acquired knowledge will be firmly

imprinted in long-term memory The behavioral procedures may include consulting with professors during faculty offices hours, establishing support groups, participating in campus-sponsored discussions and symposiums, and discovering practical applications of subject knowledge

It follows that learning -- the acquisition and application of knowledge -- is likely to be enhanced through instructional and teaching paradigms that assist students in developing more effective learning strategies, that encourage student exploration and student-teacher collaboration, and that utilize multimedia and interdisciplinary environments that promote critical inquiry and real-life analytical problem-solving

In its next report on technology and learning, the California Postsecondary Education Commission will review the literature regarding the effectiveness of technology-mediated instruction, and discuss the ways in which the public higher education systems are using research to improve teaching and learning It is anticipated that the analysis of technology and pedagogy will strengthen the theoretical and practical basis for State investment in technology

Overall, the mind set of everyone in higher education will prove to be critical as both the tidal wave of new students, and the 21st century, approach Most would agree that change of some kind is inevitable, and that technology alone will change some people's thinking about the way things are done

3 National and Regional Collaborations

Joel Barker, author of *Future Edge*, makes a distinction between management and leadership by suggesting that we manage within a paradigm, but we lead between paradigms There appears to be widespread agreement among educational planners working on a regional basis that what California needs is leadership that moves public colleges and universities to a completely new paradigm that is student-centered There also appears to be considerable agreement that the new learning infrastructure will need to be national in scope based on collaborative efforts among institutions that scale beyond the local and state level (Twigg, 1995)

Described below are some of the key national and regional technology initiatives that are being sponsored by EDUCOM, the State Higher Education Executive Officers (SHEEO), the Western Governors' Association (WGA), and the Western Interstate Commission for Higher Education (WICHE) As shown by Display 3, these efforts are directed toward establishing a Western Virtual University, promoting universal access to information and computers, reducing the cost of telecommunications products and services, expanding student access and productivity while containing costs, and developing valid and reliable evaluation models for describing and measuring the impact of technology on educational outcomes

EDUCOM: The National Learning Infrastructure Initiative

EDUCOM is a consortium of over 800 colleges and universities and corporate associates committed to innovation and reform in business and education through environments and arrangements that harness the power of information technology "The National Learning Infrastructure Initiative" (NLII) was established by EDUCOM in 1995 in order to respond strategically and effectively to the opportunities and challenges presented by the creation of a national information infrastructure proposed by the Clinton-Gore administration and financed by the Department of Commerce

DISPLAY 3   National, Regional & Interstate Technology Initiatives Impacting California Postsecondary Education by Intended Area of Impact

National, Regional & Interstate Technology Initiatives	Student Learning			Instruction		
	Learning Research	Student Outcomes	Distributed Learning	Instruct. Design	Training & Support	Infra-structure
EDUCOM *National Learning Infrastructure Initiative*	X	X	X	X	X	X
State Higher Education Executive Officers (SHEEO) *Universal Access to Information & Computers*		X	X			X
Western Interstate Commission for Higher Education (WICHE)						
-Principles of Good Practice for Electronically Offered Degree Programs		X	X			
-Interstate brokering of Certificate and Degree Programs		X	X	X	X	
-Western Joint Purchasing Initiative						X
-Flashlight Project -- Developing Tools for Evaluation of Educational uses of Technology	X			X		
Western Governors' Association *A Western Virtual University*		X	X			X

Ultimately, the information superhighway would enable universal access to information resources by linking every home, school, workplace, and hospital in the United States and in the world

The NLII encourages colleges and universities, publishers, software developers, and other key players to collaborate to find solutions to problems that cannot effectively be solved on an institution-by-institution basis Through these partnerships, the NLII seeks to create, evaluate, and promote learning products and processes that are likely to lead to the development of learning environments that are high quality, cost effective, and accessible Presently, over 160 educational institutions and corporations are partners in the learning initiative, including the College Board, the Educational Testing Service, the Council of Independent Colleges, the State Higher Education Executive Officers, the California Postsecondary Education Commission, and each of the three public systems of higher education in California

Some of the thematic strategies of the initiative include determining which forms of technology-mediated instruction are the most effective for diverse populations of learners, determining the comparative costs and benefits of technology-mediated learning, identifying which investment strategies at the federal, state, institutional, and corporate levels will yield the maximum benefits for higher education and its partners, and stimulating the development of high-quality, affordable software and learning tools that meet challenging content standards

State Higher Education Executive Officers: A Strategy for Universal Access to Computers

The State Higher Education Executive Officers (SHEEO) is a nonprofit, nationwide association comprised of executive officers serving statewide coordinating and governing boards of postsecondary education In November 1995, the Association, in collaboration with the California State University and EDUCOM's National Learning Infrastructure Initiative, outlined a strategy and rationale for putting networked computing devices in the hands of all learners enrolled in higher education institutions The universal access strategy, in effect, would make a laptop computer and access to the Internet available to students 24 hours a day The strategy is considered fundamental to a student-centered educational philosophy that values learning at any time and any place

The rationale for universal access stems in part from the realization that personal, continuous access to computers and the network would enable students to better link information resources with other parts of their

academic experiences   Since timely access to relevant information tends to be intellectually arousing, students are more likely to become actively involved in the learning process and exhibit a greater interest and desire to pose insightful questions, test hypotheses, and discern relationships among ideas or variables   The strategy also would make information resources more accessible for part-time students and working adult learners who traditionally had been limited to computer laboratories that may have been out-dated, overcrowded, and available only during selected hours

A survey of selected colleges and universities that have implemented some form of universal access revealed that student ownership and technology fees tend to be the two major approaches to funding information access   At some institutions, for example, students are given the option of purchasing a computer outright, or entering into an agreement with a preferred vendor and having the price of the computer amortized over four years   In other universities, students are loaned computers that have been leased by the institution   Under the technology fee approach, students either are charged a special technology fee for computer services or the related costs are added to undergraduate fees or school tuition   Technology fees have typically ranged from $50 to $300 per semester and have covered a wide range of services, from basic network connections to a leased laptop complete with multimedia software that is upgraded annually

Designing and implementing universal access programs have been shown to require significant planning and institutional deliberation   California State University, Sonoma is in the processing of implementing an assured access program that is analogous to the textbook model   Beginning with the fall 1995 freshman class, and continuing with each subsequent freshman cohort, entering students will be expected to have access to a computer   As with required textbooks, however, the student will be able to decide the way to meet the requirement without necessarily buying a computer   For example, students may elect to share computers, borrow from a friend, or use computers located in libraries and student workstations   Pending approval by the Board of Trustees, the University may impose a technology fee beginning in fall 1996   The expectation for computer access is set by the faculty in the context of learning and instruction and the university does not intend to monitor compliance with the requirement

Other California institutions that are in the process of implementing a universal access program include California State University, Hayward, Humboldt State University, and California Polytechnic State University, San Luis Obispo   The SHEEO report recommends that the cost of universal

access be borne jointly by the students and institution, and that adequate financial assistance be made available so that no student is taken out of the market for higher education based exclusively on an inability to obtain access to a computer

The Western Governors' Association: A Virtual University

The Western Governors' Association (WGA) is a bipartisan, nonprofit association that promotes excellence and innovation in State government through interstate collaborative planning. The association includes the governors of the western states and the pacific islands (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming, American Samoa, Guam, and the Northern Mariani Islands). These state officials envision technology-based teaching and learning as a means of aligning postsecondary education with the needs of a transforming economy and society, expanding access by delivering instructional content into the home or employment site of the learner, and reducing educational costs by providing a vehicle for cost sharing among states. In 1995, a design team was appointed to draft a plan that would establish and finance a Western Virtual University. This Virtual University is to offer courses and award certificates or degrees exclusively or primarily through computer networks, interactive broadcasts, and other technologies that substantially minimize the need for physical instructional facilities. The governors intend to appoint a committee to meet with regional and specialized accrediting boards in order to resolve issues relating to accreditation

Western Interstate Commission for Higher Education

The Western Interstate Commission for Higher Education (WICHE) is a regional educational organization established in 1953 by the western states to promote and facilitate resource sharing, collaboration, and cooperative planning among the member states and their colleges and universities. WICHE operates under the Western Regional Education Compact that was adopted by the respective legislatures and approved by the United States Congress. The member states are Alaska, Arizona, California, Colorado, Hawaii, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming

In 1989, WICHE established the *Western Cooperative for Educational Telecommunications* to facilitate resource and information sharing in the use of telecommunications. The Western Cooperative is sponsoring four initiatives that are particularly relevant to higher education planning efforts in California: 1) Principles of Good Practice for Electronically Offered

Academic Degree and Certificate Programs, 2) Interstate Brokering of Certificate and Degree Programs, 3) Western Joint Purchasing Initiative, and 4) the Flashlight Project -- Developing Tools for Local Evaluation of Educational Uses of Technology

The *"Principles of Good Practice"* were developed to help ameliorate a continuing dilemma concerning distributed learning across state boundaries In one sense, states want to ensure that distributed learning opportunities meet appropriate quality standards, yet it is perplexing to recognize state and regional boundaries with electronic delivery systems that, in theory, defy such constraints While states certainly have the authority to regulate educational entities acting within their own boundaries, the location of the entity is becoming a problem For example, does the presence of an electronic signal from a satellite necessarily trigger authority from the state of origin or from the receiving state(s)? Should Internet-assisted instruction be subject to state regulation? The Western Cooperative believes that the most reasonable solution to these challenging questions is to regulate telecommunicated learning at its origin through consensual reciprocity Adoption of the principles is believed to be an important starting point for consensual oversight and the establishment of consistent and reliable indicators of educational quality The principles convey indicators of quality specific to the domains of "curriculum and instruction," "institutional context and commitment," and "evaluation and assessment " (See Appendix B)

The *Western Brokering Project* was established by WICHE in 1994 to promote interstate cooperation in matching the educational needs of rural communities in the west with the educational resources of selected colleges and universities Prospective institutions are considered for participation if they offer unique programs that are not readily available in local communities, use a mix of learning technologies, and offer programs that are likely to appeal to potential students in the rural communities of the western region Project staff members and state liaisons provide assistance in program development, interstate arrangements, and promotion of programs to potential students

To date, six degree and certificate programs have been developed to be offered across state lines These include (1) an Associate Degree in Health Information Management, offered by the University of Alaska Southeast, (2) a Certificate in Emergency Medical Services Administration, sponsored by

California State University, Chico, (3) a Hazardous Waste Management Program, offered through the consortium of universities known as the National Technological University of Colorado, (4) a Library Information Systems Technology Program, sponsored by Front Range Community College, Colorado, (5) Masters of Science in Space Studies, a program of the University of North Dakota, and (6) a Surveying Certificate Program, offered by the University of Wyoming The Western Brokering Project is funded in part by the U S Department of Commerce's Telecommunications and Information Infrastructure Assistance Program

The *Joint Purchasing Initiative* was created in 1994 to plan, implement, and manage a cooperative purchasing infrastructure among member states Master Agreements are negotiated with preferred providers in order to reduce the costs of telecommunication services and products, enhance the quality of educational telecommunications, and influence standards and new electronic devices that will increase the interconnections among western postsecondary institutions Through the purchasing initiative, bids are solicited from vendors who are interested in becoming a preferred provider of designated equipment and services All bids are kept confidential until an "intent to award" is announced Contract awards are made after determining the vendor's reputation and ability to meet all bid terms and conditions Priorities have been established initially for the purchase of coders, routers, scheduling software, long distance access, and for the design and equipping of prototype electronic conference sites and class rooms Interested colleges and universities are responsible for placing custom orders

Through the *Flashlight Project. Developing Tools for Local Evaluation of Educational Uses of Technology,* the Western Cooperative is developing evaluation measures and procedures for measuring the influence and effects of technology on student outcomes, enrollment and attrition, shifts in patterns of teaching and learning, and changes in faculty roles The Flashlight Coalition consists of Indiana University, Purdue University, the Educational Network of Maine, Maricopa Community College District, the Rochester Institute of Technology, and Washington State University

In 1995, the Western Cooperative completed an evaluation of California State University's Young Scholars Program This program involved the delivery of college-level courses by five State University campuses to students attending 25 rural high schools The evaluation provided the State University with important information regarding the inter-campus planning

process, the support needed by rural schools to work successfully with campuses, and the reactions of students and faculty to technology-mediated learning In addition to evaluation and research development, the Flashlight Coalition, principally through the efforts of Purdue University, is developing a cost model for estimating certain changes in total educational costs resulting from the use of technology

4 Recent Activities in California

Recent Legislation enacted or introduced in California to address the use of technology has included Senate Bill 1202 (Hart, 1989), which directed the California Postsecondary Education Commission to develop a policy statement for distance learning, Assembly Bill 1470 (Farr, Morgan, and Quackenbush, 1989), which established the California Planning Commission for Educational Technology, Assembly Bill 2477 (Archie-Hudson), which if approved, will establish the Higher Education Efficiency and Innovation Act of 1996, and Executive Order W-93-94, which established the Governor's Council on Information Technology

Senate Bill 1202 (Hart, 1989)

Senate Bill 1202 (Hart, 1989) directed the *California Postsecondary Education Commission* to develop a policy statement on the use of distance learning technology in education   More specifically, the Commission was requested to compile research on the cost-effectiveness of distance learning, and to address policy issues related to quality, intersegmental distance learning efforts, credit transfer, and credentialing   In April, 1991, the Commission provided the Governor and Legislature with the report-- *State Policy on Technology for Distance Learning* -- that included preliminary research findings on the cost-effectiveness of distance learning and a statement of seven principles to guide the development of a policy for distance learning, now referred to as distributed learning   Although a review of the literature indicated a limited number of studies on the effectiveness of distributed learning, the findings suggested that distributed education is as effective, if not more effective, than learning in traditional classrooms (Clark and Verdiun, p 25)   A stronger case was made for the cost-effectiveness of adult distributed learning because of the potential savings on travel and employee time

The primary conclusion of the report was that California should establish a coordinated statewide technology distributed learning system based on seven key principles

♦   distributed learning should be consistent with the State's concern for equity, quality, efficiency, diversity, and accountability in instruction,

♦ distributed learning should serve to enhance workforce skills and competencies,

♦ the State should encourage the use of multiple technologies in distributed learning,

♦ in expanding the use of distributed learning, the State should emphasize service to non-traditional populations, ease of access, and in the long-run, lower costs,

♦ the State should provide incentives for institutions to expand distance learning offerings rather than prescribing or mandating institutional actions,

♦ the standards for course and program quality for distributed learning should match those of classroom instruction, and

♦ the State should encourage collaboration between private industry and higher education to enhance quality and expand the delivery of educational services to the work site

Assembly Bill 1470 (Farr, Morgan, and Quackenbush, 1989)

The California Planning Commission for Educational Technology was established in 1989 by Assembly Bill 1470 (Farr, Morgan, Quackenbush) to prioritize the integration of technology in California public schools, colleges, and universities Its charge included recommending a governance structure to coordinate the infusion of technology across educational segments, identify problems and issues that technology might help resolve, and determine the viability of establishing a statewide network to increase the capacity and efficiency of transmitting multimedia data In 1992, the Commission and provided the Governor with *The California Master Plan for Educational Technology* that included nine recommendations along with action plans for implementation

The Commission forewarned the State that the future success of education in California would depend, to a large degree, on equity of access to technology resources Their report noted that

A wide disparity of students, staff, and faculty access to technology resources exists in California There is an urgent need for access to technology in every learning environment Research and

development projects to identify effective uses of new technologies in education are limited in scope and duration, and their results have not been widely disseminated (P 5)

Accordingly, the Commission endorsed the concept of technology in every learning environment and recommended that all faculty, staff, and students be provided with the full range of multimedia resources necessary to meet identified needs To help realize this goal, the plan called upon public and private entities to collaborate to develop, implement, evaluate, replicate, and disseminate innovative programs and technology-based products To ensure the effective use of technology, the Commission recommended that all educational institutions provide sustained, professional development and support services to faculty, staff, and students It was also suggested that improved performance standards be established for the use of technology, and that Full Service Centers be created where faculty, staff, and institutions could receive assistance in the acquisition and purchase of technology products

The Planning Commission proposed to establish *The Golden State Education Network* as a statewide, telecommunications infrastructure that would support learning by interconnecting all public educational facilities and institutions in California using standardized protocols for transmitting and receiving digital data An intersegmental coordinating committee was proposed with the charge to develop cost-effective and equitable methods for establishing the network The committee would also assess the potential of existing communications delivery mechanisms to improve and expand intersegmental linkages To fund the network of the other recommendations, the Planning Commission proposed State support at the rate of $100 for each public school student and $100 for each full-time equivalent postsecondary student The complete list of recommendations are provided in Appendix C of this document

Executive Order W-93-94

The Governor's Council on Information Technology was established in 1994 by Executive Order to determine how California schools and governmental entities could use information technology to increase the efficiency and effectiveness of government, improve access to public information and services, improve student learning, and provide cost-effective telecommunications services In 1995, the Council provided the Governor with a report -- *Getting Results* -- that included 20 policy recommendations and a timetable for implementation The recommendations are organized by the above four identified areas of concern However, the telecommunications bill that was signed by President Clinton in February,

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1996 addressed most of the concerns the Council had expressed regarding greater competition and investment in the telecommunications industry

To ensure that the essential needs of customers are being served, the Council concluded that government needed to re-engineer itself with a focus on the delineation and achievement of outcomes rather than being overly attentive to discrete processes It was noted that " unless senior managers correctly perceive their department's mission, automation will only help get a faster answer to a wrong question " To reduce the need for agencies to maintain costly, in-house expertise, the Council advised the Governor that every State department and agency be required to assess the comparative costs, benefits, and risks of out-sourcing (i e , buying solutions) essential services

The report provided four recommendations aimed at making public information more accessible The Council appealed to the Governor to promote the concept of *topic-driven access* to information as opposed to *access by organizational bureaucracy* This would be made possible by the State establishing a one-step (i e , topic-driven), user-friendly, electronic home page on the Internet where customers could retrieve public information from their home, workplace, school, library, or other locations where computers were accessible It was advised that all public agencies be required to phase-in electronic access to public databases within five years To facilitate learning in postsecondary institutions, the Council recommended that

> California's public college and university systems should convene a summit and maintain ongoing efforts to achieve efficiency gains, reduce course overlap, enhance value to students, promote distance learning opportunities across systems, consolidate regular and extension curricula, and reach a consensus on providing lifelong learning needed by California workers

Regarding the California State University, the Council recommended that the Commission on Teacher Credentialing work with the State University to establish rigorous standards for teacher competency in computer-based applications and their effective use in student learning Effective fall 1997, the proposed policy would preclude new teachers from being certified if they failed to meet the standard The recommendation also called for the Credentialing Commission and the State University to implement a training program for current teachers

To ensure effective training and learning, the Council proposed that a Center for Technology-Based Learning be established at California State University, Monterey Bay Among other activities, the Center would provide training and support for teachers, develop methods to measure the effectiveness of technology-enhanced learning in contrast to other instructional methods, cooperate with private industry to develop learning software and courseware, and disseminate information regarding the effective use of technology All 20 recommendations and time lines are included in Appendix D of this document

Assembly Bill 2477 (Archie-Hudson)

In February of 1996, Assembly Member Archie-Hudson introduced AB 2477, The Higher Education Efficiency and Innovation Act of 1996, which is currently undergoing revision As introduced, the bill authorized the Regents of the University of California, the Trustees of the California State University, and the Board of Governors of the California Community Colleges to enter into interstate agreements for the operation of a virtual university The three public systems of higher education would be permitted to offer any of their courses through an Internet-mediated environment The bill requested the California Postsecondary Education Commission to conduct a comprehensive evaluation of specific issues arising from the proposed operation of a virtual university

California State University, Monterey Bay

It may well serve to end this discussion of state-level activities in California with a description of the newest of the State University's campuses, for much of the planning and early operation of that institution speaks loudly to both transformation and technology in the coming decade and longer California State University, Monterey Bay is in its first year of operation on a drastically downsized army base (Fort Ord), has fewer than a thousand students, and no formal academic plan Yet, it represents one of higher education's brightest hopes for a transformed future The broad outlines of its academic plan are coming into focus, and for numerous reasons, it is clear that this will not be just another comprehensive university on the traditional model That it will incorporate technological applications into every aspect of learning is neither unusual nor surprising, the surprises derive from its pedagogical orientation on student mastery of subject matter, its strong interface with the world of work, flexible scheduling, and massive networking

The campus has its own Internet site as well as several local area networks, and all students will be required to possess a laptop computer Course materials will come from a variety of sources, virtually all of which will be

networked, and where lectures exist, they will be videotaped so that students can view the material at their convenience while maintaining their employment and family responsibilities

Throughout their collegiate careers, students will engage in a "Pro-seminar" for both the general education and academic major phases of their careers that will guide them through the institution, provide learning skills, and deliver a sense of purpose and mission to the learning process At the end of their studies, students will be required to demonstrate the skills they have obtained before receiving a degree, regardless of their "seat time" or credit accumulations

The Monterey Bay experience is limited, innovative, and experimental, but it is pointed in a direction that looks far more like the 21st century than the 19th Following the Dolence/Norris paradigm noted in Display 2, their efforts are highly networked, learning-centered, competency- or mastery-based, distance and almost schedule free, connected (if not quite "fused") with the working world, and probably perpetual as graduates will be able to return later to upgrade existing skills or acquire new skills The faculty and administrators at Monterey Bay would be the first to concede that they have a very long way to go, and even that some of the technology they need is not yet available, or perhaps not powerful enough Yet the start is promising, and it seems likely that lessons will be learned there that can be exported to other campuses, and indeed to other systems

5 Conclusion

There may be no more formidable challenge facing California higher education than that of persuading people to do business differently Although all educational institutions are experiencing some degree of change, for many faculty and administrators the need for change may not seem so apparent, since students continue to enroll and take classes, since everyone continues to receive compensation, and since life on the campuses seems more or less normal

Within the statewide policy arena, it is clear that change is inevitable, and that it will occur regardless of whether people take definitive steps to direct it Indeed, the failure to decide is in itself a decision, and a decision with real consequences for the lives of real people Tidal Wave II is coming, and California cannot afford to educate in traditional ways all of the students who will soon seek admission The growing technological revolution is creating -- and to a degree has already created -- an Information Age that offers innumerable possibilities for changing the way people learn, live, and work Those changes involve a considerably different mind set from the one that many are used to a change from didactic classroom and laboratory presentations to networks employing multi-media and virtual reality, from teaching at the convenience of the faculty to learning at the convenience of the student, from set schedules to open schedules, from course completions to mastery of an entire field of knowledge, from continuing education to perpetual learning, and from rigid bureaucratic organizations to fluid and flexible decision-making structures And just as technology has increased the speed of almost everything people do in the 1990s, it is also threatening the relaxed and reflective environment that has been so cherished on campuses for as long as anyone can remember

As policy makers proceed into the 21st century, it will be extremely important to consider two possibilities (1) that some of higher education's most important strengths may be compromised or lost in the rush to serve ever greater numbers of students with ever diminishing resources, and (2) that California's economic and cultural richness may be compromised if ways are not found to provide high quality educational services at a reasonable cost for the growing numbers of citizens who need them

In 1995, the Commission offered *The Challenge of The Century* The dilemma defined by the above two possibilities may form much of the framework of that challenge in the years ahead

Appendix A: Senate Bill 1202 (Hart, 1989)

CHAPTER 1038

An act to add Chapter 14 (commencing with Section 11300) to Part 7 of the Education Code, relating to education

LEGISLATIVE COUNSEL S DIGEST

SB 1202, Hart   California Distance Learning Policy

Existing law, which became inoperative on June 30, 1989, established the Educational Technology Local Assistance Program which was authorized to award various types of grants for certain specified purposes to school districts, county offices of education, sponsors of regional occupational programs, public postsecondary educational institutions, individual teachers, and teacher education and computer centers meeting the eligibility criteria

This bill would require the California Postsecondary Education Commission to develop a state policy on the use of distance learning technology, as defined, in education, to be considered and, if appropriate, adopted by the Legislature This bill would require the commission, in developing the policy, to address specified issues and to compile research on the effectiveness and cost-effectiveness of distance education at various levels of education The bill would require that the policy be developed to recognize the several existing distance learning networks, to enhance their coordination and direction, and to provide statewide incentives to build partnerships that further distance learning, as specified The bill would require the commission, in developing the policy, (1) to propose a strategy to provide the 5 types of educational services of curriculum enhancement, expanded course offerings to rural and inner-city secondary schools, expanded course offerings at rural community colleges and off-campus centers, staff development courses for elementary and secondary teachers, and curriculum enhancement through the increased communication capability of schools, colleges, and universities and (2) to draw upon the experience and findings of the various campuses of the California State University that currently offer courses via distance education

The bill also would require the commission, in developing the policy, to identify existing sources of interactive distance learning instructional and staff development programming that can be utilized immediately by schools and colleges and to propose a strategy to utilize existing technologies to deliver instruction over distance, and link together school and college classrooms in rural and inner-city areas in the state

The bill would require the commission, in preparing the policy

statement, to consult with an advisory committee having prescribed membership

The bill would require the policy statement to be submitted to the legislative policy committees and the Governor on or before May 1, 1990

The bill would state the intent of the Legislature that, following the development of the policy statement, educational institutions consider the preparation of a budget proposal to establish a comprehensive distance learning project within California

The people of the State of California do enact as follows

SECTION 1   The Legislature finds and declares as follows

(a) The instructional technologies provide California with excellent opportunities to accomplish important long-range educational objectives efficiently These opportunities include all of the following

(1) Expanded access to higher education for individuals who currently do not participate because of geographical isolation or language barriers

(2) The development and implementation of an expanded and enriched high school curriculum utilizing faculty members of various schools, colleges, and universities working together through a collaborative effort, particularly for advanced mathematics, science, and language courses that many high schools do not have the resources to offer

(3) The development and implementation of in-service training programs for teachers and staff at all levels of public education in kindergarten and grades 1 to 12, inclusive, through a partnership utilizing outstanding public school teachers and faculty at colleges and universities

(4) Meeting the challenges of changing demographics in the pupil population, including the needs for remediation, greater English literacy, and preparedness for postsecondary education

(b) High school graduates from rural counties are significantly less likely than high school graduates statewide to be eligible for admission to a four-year college or university A primary reason for the differing rates of eligibility to California's colleges and universities is that many small rural high schools are isolated and do not have enough pupils to support advanced or specialty courses offered by larger or less isolated schools, and some schools are not able to supply the resources or qualified staff necessary to offer courses in certain areas, including, but not limited to, science, foreign language, or mathematics

(c) The state, in order to meet the educational needs of all of its public school pupils and their teachers, needs to consider the efficiency, impact, and expansion of distance education technology

"Distance learning," for the purposes of Chapter 14 (commencing

with Section 11300) of Part 7 of the Education Code, means interactive instruction in which the instructor and student are separated by distance yet interact through the aid of computer and communications technology "Distance learning" may also include, for the purposes of that chapter, video or audio instruction in which the primary mode of communication between instructor and student is through a communications medium such as instructional television or video, and any other instruction that relies on computer or communications technology to reach students at distant locations California's educational institutions need to combine their efforts to explore the most efficient ways to expand the use of distance learning technologies to reach all pupils and teachers who may benefit from them

(d) The Commission for the Review of the Master Plan of Higher Education concluded in 1987 that the new instructional technologies have the exciting potential for revolutionizing the educational process. The commission recommended that the governing boards of educational institutions establish appropriate infrastructures in their systems and on their campuses so that the new instructional technologies are effectively integrated in the support of the fundamental institutional missions, and also recommended that the California State University have the principal responsibility for research on the impact of the new technologies on the learning process.

(e) California has no formal state policy on the use of distance learning Because of this, no policies are in place for the appropriation of funding, coordination among service providers and users, or guidelines for faculty and administration

SEC 2 Chapter 14 (commencing with Section 11300) is added to Part 7 of the Education Code, to read

CHAPTER 14 THE CALIFORNIA DISTANCE LEARNING POLICY

11300 The California Postsecondary Education Commission shall develop a state policy on the use of distance learning technology in education, to be considered and, if appropriate, adopted by the Legislature Further, in developing the policy, the California Postsecondary Education Commission shall address issues of funding and management of intersegmental distance learning efforts, course credit transfer, qualifications and credentialing of instructors and onsite personnel, ensuing course quality, and other policy issues associated with distance education, as well as, compile research on the effectiveness and cost-effectiveness of distance instruction at various levels of education

The policy shall be developed to recognize the several existing distance learning networks, to enhance their coordination and direction, and to provide statewide incentives to continue to build partnerships that further distance learning as a cost-effective means

to address resource equity and quality issues in education. In formulation of the policy, the California Postsecondary Education Commission shall specifically draw upon the experience and findings of the various campuses of the California State University that currently offer courses via distance education, including California State University, Bakersfield, California State University, Chico, the California Polytechnic University, Pomona, as well as, draw upon the experience and findings of other current providers of distance education programming

11301. (a) In developing the policy, the California Postsecondary Education Commission shall propose a strategy to provide, through a cost-effective distance learning delivery system, the following five types of educational services.

(1) Curriculum enhancement to meet the needs of high-risk pupils who would otherwise be likely to drop out of traditional classroom programs.

(2) Expanded course offerings, in subjects that include, but are not limited to, foreign languages, science, and mathematics, to rural and inner-city secondary schools that are unable to provide the college preparatory and enrichment courses that their pupils require and that other schools provide

(3) Expanded course offerings at rural community colleges and off-campus centers to better serve students in remote parts of the state. These expanded offerings should include university level courses to better serve community college students who are considering a university-level education but do not have the financial resources to transfer

(4) Staff development courses for elementary and secondary school teachers who might otherwise be unable to participate in these training opportunities.

(5) Curriculum enhancement through the increased communication capability of schools, colleges, and universities providing the opportunity for institutions to receive varied types of supplementary educational programs, conduct exchanges with business, industry, and government, participate in live lectures and conferences on special topics, and increase cooperation and communication among educational institutions.

(b) In developing the policy, the California Postsecondary Education Commission shall identify existing sources of interactive distance learning instructional and staff development programming that can be utilized immediately by schools and colleges, and propose a strategy to utilize existing technologies to deliver instruction over distance, and link together school and college classrooms in rural and inner-city areas in the state.

11302. (a) In preparing the policy statement, the California Postsecondary Education Commission shall consult with an advisory committee composed of representatives from public schools, a county office of education, the State Department of Education, the

California State University, the California Community Colleges, the University of California, the independent accredited universities and colleges, the governing board of a school district, the Educational Technology Committee, and private sector providers of communication networks and programming

(b) The commission shall submit the policy statement to the legislative policy committees and the Governor on or before May 1, 1990

(c) Following the development of the policy statement, it is the intent of the Legislature that educational institutions consider the preparation of a budget proposal to establish a comprehensive distance learning project within California.

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Appendix B: Principles of Good Practice for Electronically Offered Academic Degree and Certificate Programs

Principles of Good Practice for Electronically Offered Academic Degree and Certificate Programs

Curriculum and Instruction

- Each program of study results in learning outcomes appropriate to the rigor and breadth of the degree or certificate awarded

- An electronically offered degree or certificate program is coherent and complete

- The program provides for either real-time or delayed interaction between faculty and students and among students

- Qualified faculty provide appropriate oversight of the program electronically offered

Institutional Context and Commitment

Role and Mission

- The program is consistent with the institution's role and mission

- Review and approval processes ensure the appropriateness of the technology being used to meet the program's objectives

Faculty Support

- The program provides faculty support services specifically related to teaching via an electronic system

- The program provides training for faculty who teach via the use of technology

Resources for Learning

- The program ensures that appropriate learning resources are available to students

Students and Student Services

- The program provides students with clear, complete, and timely information on the curriculum, course, and degree requirements, nature of faculty/student interaction, assumptions about technological competence and skills, technical equipment requirements, availability of academic support services and financial aid resources, and costs and payment policies

- Enrolled students have reasonable and adequate access to the range of student services appropriate to support their learning

- Accepted students have the background, knowledge, and technical skills needed to undertake the program

- Advertising, recruiting, and admissions materials clearly and accurately represent the program and the services available

Commitment to Support

- Policies for faculty evaluation include appropriate consideration of teaching and scholarly activities related to electronically offered programs

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- The institution demonstrates a commitment to ongoing support, both financial and technical, and to continuation of the program for a period sufficient to enable students to complete a degree/certificate

Evaluation and Assessment

- The institution evaluates the program's educational effectiveness, including assessments of student learning outcomes, student retention, and student and faculty satisfaction   Students have access to such program evaluation data

- The institution provides for assessment and documentation of student achievement in each course and at completion of the program

Appendix C: The California Planning Commission for Educational Technology; Recommendations Contained in The California Master Plan for Educational Technology

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o address these needs and meet the
Commission's established objectives, the California Planning Commission for Educational Technology created the following recommendations to provide action steps for the Master Plan. No single source of funding is suggested to support these recommendations. Although existing state funds earmarked for educational technology will provide initial support for specific recommendations, much of the funding or support must come from businesses and from consumers who are interested in enhancing our citizens' personal, social and economic status through the use of technology in education. Additionally, existing funding sources in each of the educational segments might be reallocated to implement some of these recommendations.

Although the implementation of these recommendations may require additional financial investment, the Commission projects long-term increases in the productivity of learners and faculty through effective instructional delivery. Further cost savings should be realized through economies of scale brought about by consolidation of resources and increased numbers of users of the technologies.

RECOMMENDATION 1 TECHNOLOGY IN EVERY LEARNING ENVIRONMENT

Provide access to an array of information and instructional technology devices and resources for every learner, faculty and staff member in every teaching/learning environment

Implementation Actions

1 Technology for All Faculty - Provide an array of information and instructional technology devices and resources for all faculty members in each of the four public educational segments to meet their individual instructional management, communication and research needs

Time line This recommendation must be accomplished by August 1997

Information and instructional technologies for a K-12 teacher might include a computer, laser videodisc player, printer, telephone, modem, VCR, CD Rom player, camcorder, tape recorder, and large television. The Education Council for Technology in Learning (see Recommendation 7) must establish standards for coordinating student and staff access to technology, i.e. number of students and staff per computer, printer, television, video and audio recording capability, playback equipment, and access to a variety of voice, video, and data resources to produce and receive information. Although specific items of equipment have been identified, local discretion to choose and allocate resources is essential to the successful use of these technologies.

As new or upgraded technologies appear, the list of "ideal" technology-based resources may change significantly. Full accomplishment of these implementation actions may be phased over a period of five years and will make allowance for the continuous upgrading of these items as the implementation continues.

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2 *Technology for All Students* - Provide an array of information technology devices for all learners in each of the four public educational segments as appropriate to the students learning environments needs and particular instructional programs

   Time line This recommendation must be accomplished by August 1998

3 *Technology for All Staff* - Provide an array of appropriate information technology devices for non-instructional staff and managers in each of the four public educational segments

   Time line This recommendation must be fully implemented by August 1990

4 *Coordinating Technology Into Existing Programs* - Provide planning guidelines funding and incentives for schools colleges and universities to incorporate and improve technology within existing local programs

   Time line This recommendation must be fully implemented by August 1994

We must encourage K-12 schools to incorporate technology into existing school, district, and institutional plans and initiatives. Incentives to use local funds to support the use of technology must be developed. The emphasis in this recommendation is for schools to involve the faculty, administration and staff in coordinated decision-making and planning for technology.

5 *Community Partnerships* - Expand electronic delivery of instructional programs to work sites through partnerships between employers educational agencies institutions and community-based organizations

   Time line This recommendation must be fully implemented by August 1994

6 *Resource Development and Distribution* - Education and industry must collaboratively develop implement evaluate replicate and disseminate innovative programs and technology-based materials that are deemed to meet the needs of students and educators in California

   Time line This recommendation must be fully implemented by December 1994

Successful K-12 models, such as the California Technology Project, site-based technology grants, consortia, instructional television agencies, organizations and projects which coordinate technology resources should continue to be funded in the short term to provide a continuing infrastructure for California K-12 education while the Master Plan is being implemented.

RECOMMENDATION 2 PROFESSIONAL DEVELOPMENT AND SUPPORT

Provide sustained professional faculty and staff development and technical support for every information technology user in the teaching/learning process

Implementation Actions

1 *Staff Development* Expand opportunities for and access to staff development and technical assistance services to support effective use of technology in schools and other learning environments Ensure the coordination of the services of all public and private providers in the delivery of pre-service and in-service professional development and technical assistance related to the use of technology in education

Time line This recommendation must be fully implemented by December 1994

2 *Maintenance and Support* Establish supplement or extend repair maintenance and technical support operations

Time line This recommendation must be fully implemented by December 1994

3 *Certification and Evaluation* - Develop and implement improved performance-based standards for the use of technology in management and instruction to be used in teacher and administrator certification and evaluation

Time line This recommendation must be fully implemented by August 1995

Create "full service" centers where faculty, staff members, and institutions receive assistance to facilitate operations related to acquisition and purchase of educational technology tool kits. These centers will consist of combinations of existing commercial operations, public facilities, and other newly-developed resources.

4 *Support Personnel* Provide incentives and support personnel to help faculty students parents and business/industry use technology to successfully meet the learning language and cultural challenges encountered in the learning environment

Time line This recommendation must be fully implemented by August 1995

Mentors, technicians, credentialed library media professionals, and others are needed to provide the support necessary for successful integration of technology in the educational setting. Many schools and colleges already provide such personnel, and, in some cases, personnel can be redirected to meet this need. For many others, new personnel must be hired, and existing staff must be trained

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Establish and coordinate an integrated voice, video, and data link of existing networks to be called the *Golden State Education Network*

Implementation Actions

1 **Planning the Golden State Education Network** - Establish an expert communications engineering group to develop a phased plan for the integration of both terrestrial and satellite transmission services into a *Golden State Education Network*. The group will recommend the most cost effective, equitable, and secure method for establishing this educational network. This group, with representatives from all major communications industries and all segments of California's public educational system, will address the use of existing public and private telephone wiring, fiber, satellite and terrestrial communications cable, and other communications delivery mechanisms for improving and expanding intersegmental linkages where needed throughout California.

Time line: This recommendation must be fully implemented by December 1993

2 **Creating the Golden State Education Network** - Establish and maintain the coordinated *Golden State Education Network* to connect all of California's educational facilities to all appropriate educational resource delivery systems in all states and countries where appropriate.

Time line: This recommendation must be fully implemented by December 1994

3 **Connection to the Golden State Education Network** All existing and new schools, colleges, and universities will be appropriately constructed or retrofitted to support technology-enriched learning environments and to allow appropriate access to the *Golden State Education Network*. [10]

Time line: This recommendation must be fully implemented by August 1997

RECOMMENDATION 4 INSTRUCTIONAL INFORMATION RESOURCES

Establish new and improve existing statewide instructional and information resources

Implementation Actions

1 **Building On Proven Resources** Ensure the continuation and enhancement of proven resources now used by educators in schools and institutions of higher education to support their integration of technology into curriculum and instructional programs

Time line: This recommendation must be fully implemented by August 1994

2   *Efficient Regional Assistance* Increase efficiency, coordination, and delivery of
regional assistance in a way that improves coordination of in-state projects and
programs and expands the incorporation of technology into curriculum and instruc-
tion.

Time line This recommendation must
be fully implemented by August 1994

3   *Shared Resources* Establish a means to
identify, develop, evaluate, acquire,
catalogue, and deliver instructional
resources. These resources should be
aligned with the instructional frameworks and guidelines for each of the public
education sectors and meet the needs of California's learners, including those who
are not proficient English speakers.

Time line This recommendation must
be fully implemented by August 1994

4   *On-line Coordination* Ensure that the
instructional and information resources
identified in this recommendation are
made available on the *Golden State
Education Network* and that these
resources and others entered on the
system are continuously monitored and
maintained to ensure optimal utility
to users.

Time line This recommendation must
be fully implemented by December 1994

5   *Provisions for Limited English Speakers*
Develop a detailed strategic plan for
using the resources resulting from these
recommendations to address the needs
of all learners who are not proficient in
the use of English. This plan will de-
scribe a strategy and an infrastructure to
support the delivery of learning resources
and services to learners who have limited
English proficiency.

Time line This recommendation must
be fully implemented by August 1994

Effective collaboration, sharing of resources, and delivery will be necessary to ensure the incorporation of technology into curriculum and instruction.

Exemplary programs and projects which were publicly and privately funded in the past, will be incorporated into the system where appropriate. Local, state, national, and international voice, video, and data learning resources will be easily accessible to learners as they seek to acquire the knowledge and skills described in the state's sophisticated curriculum frameworks and other instructional guidance documents. Each educational segment will establish information resources, such as the current Software and Video Clearinghouses, for determining the quality of existing learning resources. This effort will coordinate data on quality resources identified by the educational segments Materials will be purchased or licensed for use, and current policies and regulations which now restrict the use of state and federal program funds to acquire technology-based learning resources need to be revised. Existing educational agencies will organize group-buys, and other resources will be available on a pay-for-use basis

Establish a statewide student data resource for educators

Implementation Actions

1 **Sharing Student Data**
   Develop and implement the
   California Student Information
   System to encourage the
   sharing of appropriate inform-
   ation about students among
   educational institutions and
   with certified children's
   service providers

   Time line   This recommend
   ation must be fully imple-
   mented by December 1994

2 **Ensuring Student Right to**
   Privacy - Ensure that the
   Golden State Educational
   Network regulates access to student information protects the privacy of the
   individual and continuously monitors and maintains the system

   Time line   This recommend
   ation must be fully imple-
   mented by December 1994

Establish the California Student Information System to share information about learners in order to help students stay in the educational system. Student data will be shared among educational institutions and with certified children's service providers pursuant to all pertinent laws and regulations regarding release of student information. Full implementation will include participation by the Migrant Education Student Information System, Student Information System of the Community Colleges, California State University, and the University of California

Security and accuracy will be ensured by establishing criteria and monitoring of the system by the agencies responsible for its implementation. Students' rights to privacy need not be compromised while their rights to a free and appropriate education are being ensured. The appropriate regulatory agencies will monitor the student data resource to ensure learners' rights to privacy. Permission to use the data will be provided on a need-to-know basis and only to those who are certified to access the data base

The implementation of this system will result in significant savings as various educational institutions eliminate some of the more cumbersome and time-intensive processes used currently to maintain student data

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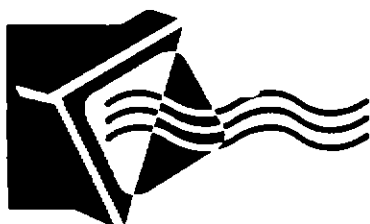
RECOMMENDATION 6 MANAGEMENT INFORMATION SYSTEM

Establish a statewide administrative management information resource

Implementation Actions

1   **Management Information Systems**
Expand on existing and provide for new
administrative and management inform
ation systems to facilitate interaction and
transmission of information within and
between all educational agencies

Time line This recommendation must
be fully implemented by December 1994

The system may include file transmission; fiscal data; state reports; student, personnel, and demographic information; the Education Code; interconnected E-mail; student applications to postsecondary institutions; advisories, student transcripts; forms, and special interest bulletin boards.

2   **On line Access To Management Information** - Ensure that the management informa-
tion resources identified in this recommendation are made available on the *Golden
State Education Network* and that these resources and others entered on the system
are continuously monitored and maintained to ensure optimal utility to users

Time line This recommendation must be completed by December 1994

RECOMMENDATION 7 EDUCATIONAL TECHNOLOGY COORDINATION

Establish a state-level intersegmental education council and an industry council to
collaboratively implement the Master Plan and to direct future planning

Implementation Actions

1   **The Education Council for Technology in Learning** Establish the *Education Council
for Technology in Learning* Education Council to

- provide for planning within and between the four segments of California's
  public education system the University of California the California State
  University the California Community Colleges and K 12 education

- ensure broad representation of educational technology stakeholders

- offer a strategic process for joint planning of technology initiatives by
  business and education and

- provide for a representative body that will advocate and communicate the
  issues and impact of the programs to key policy makers

Education Council Membership The Governor the Legislature the four public
education segments and leading private sector organizations and employers will appoint
members to the *Education Council* who will guide the implementation of the California
Master Plan for Educational Technology Appointed members to the *Education Council*
will represent the California State University the University of California the California
Community College the California Department of Education and a regional staff
development agency The *Education Council* should include a certificated practicing
elementary school teacher a certificated practicing secondary school teacher a public
school administrator business representatives a State Board of Education member

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a parent of a student in a California school, and a faculty representative from each of the postsecondary segments. The Education Council will include a minimum of 51% representation of persons involved in public education. All Education Council members shall be knowledgeable regarding technology applications in an educational setting and be selected by the appointing authorities based on documentation of such experience.

Education Council & Industry Council Crossover Membership   Four members will be elected by the *Education Council* to serve as its liaison to and members of the *Industry Council*. The four members from the *Education Council* and the four members from the *Industry Council* will serve as a joint executive committee.

Duties of the Education Council   The *Education Council* shall

- Advise the educational segments and their respective governing bodies on the implementation, monitoring, and revision, as needed, of the California Master Plan for Educational Technology

- Collaborate with the *Industry Council* in the establishment of funding priorities and identification of needs for technology in education

- Establish guidelines for collaboratively funding projects and partnerships between industry and education

- Establish and implement a process for evaluating educational technology partnership programs and projects

- Establish and implement guidelines for intersegmental cooperation regarding educational technology school programs and initiatives

- Advise the governing bodies of the participating education segments on efforts to ensure equal student access to educational technology programs

- Recommend to the governing bodies of the participating education segments an annual budget identifying proposed funding levels for intersegmental educational technology programs

- Coordinate state planning and implementation of the Master Plan technology programs and projects with the *Industry Council for Technology in Learning*

Time line   This recommendation must be fully implemented by July, 1993.

2   ***Support for the Education Council by Educational Segments***   Each of the four educational segments shall establish an executive level position to coordinate the educational technology programs and projects for that segment. These administrators will be provided with adequate staff and operating budgets to administer technology based programs within their segments and to support the recommendations of the *Education Council*. Technology planning, implementation, and evaluation shall be jointly developed by these technology managers and the *Education Council*.

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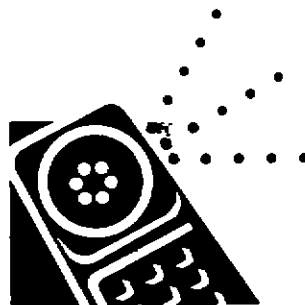
Duties of the Education Segments Duties shall include, but not be limited to the following:

- Advise the *Education Council* on educational technology plans, policies, programs, and activities.

- Ensure that all educational initiatives, reform efforts, advisories, and guide-lines include applications of technology where it is appropriate and feasible to do so.

- Promote the use of technology to support state goals for faculty and staff development, curriculum reform, administration of instructional programs, and testing and evaluation procedures.

- Collaborate with other program leaders in this plan to support the implemen-tation of the *California Master Plan for Educational Technology*.

- Establish guidelines for upgrading existing facilities and developing new facilities to accommodate the installation of current and future technologies.

- Facilitate intensive courses of study for pre-service and credentialed educa-tion personnel in appropriate and effective uses of technology.

Time line This recommendation must be fully implemented by October 1993.

3 *Collaboration with the Industry Council for Technology in Learning* - This Master Plan endorses the development of a collaboration of major industry partners, small business, and other major California employers to establish the *Industry Council for Technology in Learning* (Industry Council) as a non-profit California corporation. The *Industry Council* will serve as a holding company to receive and allocate private funding and resources to support the programs and projects recommended in the Master Plan.

Education Council & Industry Council Crossover Membership Four members will be elected by the *Industry Council* to serve as its liaison to and members of the *Education Council*. Four members will be elected by the *Education Council* to serve as its liaison to and be members of the *Industry Council*. The four members from the *Education Council* and the four members from the *Industry Council* will serve as a joint executive committee. (see *Implementation Action 1* above.)

Organizational Structure of the Councils Figure 2 shows the organization of these councils. This organizational structure provides for communication between educators and the private sector in planning and implementing in educational technology program in California.

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Cooperative Educational Technology Governing Council
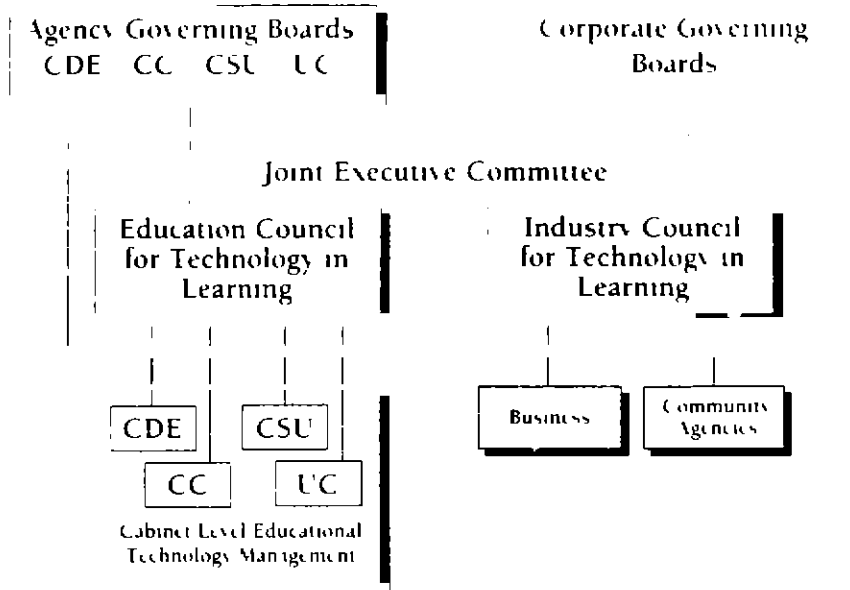
Time line This recommendation must be fully implemented by July 1993

RECOMMENDATION 8   EVALUATING THE IMPLEMENTATION OF THE MASTER PLAN

Provide for ongoing evaluation of the extent and impact of the implementation of each program and an external evaluation of the effectiveness of the program to include the proposed governance for the plan

Implementation Actions

1   **Measuring Outcomes** The *Education Council for Technology in Learning* will supervise the development design and implementation of evaluation criteria for technology programs in California and with the concurrence of the segment will select external evaluators to assess and report on the educational outcomes of such programs This evaluation shall also address the effectiveness of the governance structure established by this Master Plan

Time line This recommendation must be fully implemented by August 1994

2   **Annual Report of the Education Council** The *Education Council* shall prepare an annual report to the Governor and the Legislature This report will document the progress made by the *Education Council* in implementing the Master Plan its plans to extend and revise the Master Plan and its evaluation of the overall effectiveness of the use of educational technology in California's learning environments

Time line This recommendation must be fully implemented by Aug 1 1994

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RECOMMENDATION 9 - RESOURCES TO ACCOMPLISH THE MASTER PLAN

Provide substantial, sustained public and private funding mechanisms for implementing these recommendations.

Implementation Actions

1 *Legislative Funding* - The Legislature should provide funding to fully implement each of the recommendations indicated in this plan within the time line proposed. The *Education Council* and the *Industry Council* will support this effort with background data and recommendations as required.

   Time line: This recommendation must be fully implemented by July 1995.

2 *Future Funding Recommendations* - The *Education Council* and *Industry Council* will jointly consider and recommend to the Legislature future funding options for educational technology.

   Time line: This recommendation must be fully implemented by July 1993.

3 *Local Resources to Support the Master Plan* - Funding for Master Plan programs will require carefully developed strategic plans, evaluation procedures, and some local resources within each educational sector.

   Time line: This recommendation must be fully implemented by July 1993.

4 *Other Sources of Funding* - The four educational agencies represented on the *Education Council* shall provide funding for staff, operating expenses, and facilities. The segments will also actively seek local and business funding and/or support to fully implement each of the recommendations indicated in the Master Plan within the time line suggested. State government and other agencies will actively seek federal funding and support to fully implement each of the recommendations indicated in this Master Plan within the suggested time line.

   Time line: This recommendation must be fully implemented by July 1993.

   Private sector support of the implementation of the Master Plan shall be provided through in-kind and cash donations and through direct investments in California education. Employers will be encouraged to strengthen education through:
   1) Political support;
   2) Business plan assistance; and
   3) Industry and educational planning

5 Per Student Funding - The Legislature should fund expansion of educational technology in each of the four segments at the rate of $100 for each K-12 student and $100 for each postsecondary Full Time Equivalent student. These funds should not displace funding currently used for educational technology.

   Time line: This recommendation must be fully implemented by July 1993.

Appendix D: The Governor's Council on Information Technology; 20 Recommendations for Action

COMPILATION OF POLICY RECOMMENDATIONS AND TIMELINES

RECOMMENDATION #1

The Governor should ensure that state agencies focus on providing cost-effective services to meet their statutory mandates, and to this end each agency secretary should prepare an inventory of the agency's core responsibilities for meeting the needs of its customers, and after ratification of the inventory by the Governor, submit to him

TIMELINE → 60 DAYS

- A plan for re-engineering its operations to meet its core responsibilities in the most cost-effective manner,

TIMELINE → 6 MONTHS

- A plan for out-sourcing functions currently being performed within the agency that do not directly serve a core responsibility, and

TIMELINE → 6 MONTHS

- A comparative assessment of the costs benefits and risks of out-sourcing each function currently being performed within the agency that does directly serve a core responsibility

TIMELINE → 6 MONTHS

RECOMMENDATION #2

The Legislature should pass and submit to the public an amendment to California s Constitution removing impediments to out-sourcing when justified on the basis of cost-effectiveness and risk

TIMELINE → 1996

RECOMMENDATION #3

The Governor should require that all Requests for Proposals for information technology

- Be written in terms of "business needs" without specifying the technology to be used,
- Be written without limitation as to whether a system is sold or leased to the State and/or is operated in whole or part by a private company,
- Prefer contractors with experience in similar projects, who propose the use of proven solutions, and who submit a comprehensive and integrated bid, and
- Make payment to the contractor contingent on the agency's business need being met

TIMELINE → 60 DAYS

ECOMMENDATION #4

The Governor should establish an interagency working group, co-chaired by the Secretary of State and Consumer Services and the Secretary of Environmental Protection, in order to consolidate redundant data collection programs and reduce the costs of compliance for businesses and individuals The working group should coordinate the collection of data by state agencies, establish protocols for the exchange of information between agencies and information networks, produce guidelines for the protection of individual privacy and proprietary information, and review all plans to request data from the public However, the working group should not review the substantive need of an agency for information in order to fulfill its statutory mandates

TIMELINE → 30 DAYS

RECOMMENDATION #5

The Governor should establish on the Internet (and other public networks) a one-stop, easy-to-use, electronic gateway to state information and services — a "homepage" — and require all agencies to develop a timetable for providing basic electronic access to public databases within five years

TIMELINE → 30 DAYS

He should also promote the non-exclusive delivery of state information and services over commercial networks and at commercial establishments, as well as by commercial database operators providing "value-added' access

TIMELINE → ONGOING

RECOMMENDATION #6

The State Librarian should

*   For state and local agencies and departments whose missions would be furthered by making their information and services accessible electronically

    Provide guidance on designing systems that are user-friendly,

    TIMELINE → 30 DAYS AND ONGOING

    Establish a registry for these databases and services, as well as a system for making them accessible via the California Homepage on the Internet and other appropriate networks, and

    TIMELINE → 90 DAYS

    Establish guidelines for interfaces (i e , the manner of presentation) and database access that impose only as many restrictions as necessary to allow convenient navigation between systems by users

    TIMELINE → 120 DAYS

*   Promote broad availability and dissemination of government information, including over public and private networks, at schools libraries, and other public centers, and via value-added service providers,

    TIMELINE → ONGOING

- Promote programs that ensure accessibility to government information for all Californians — regardless of geographic location, income, or disability, and

TIMELINE → ONGOING

- Provide a clearinghouse for state and local agencies on information technology "best practices" both in and outside of California

TIMELINE → ONGOING

RECOMMENDATION #7

The Governor should ensure that

- Each state agency annually issues a public report listing each system of records which it maintains, a general description of its contents and purpose, and the method and conditions for gaining access to records, and

- Subject to legitimate law enforcement concerns, Californians can find and review state records that contain personal information about them, that systems exist to provide for the accuracy of the information, and that the information is accessible only to those people authorized by law

TIMELINE → MARCH 1996

RECOMMENDATION #8

Technology should be used across the curriculum to facilitate a student-centered learning environment This will require that computers, communications networking, and multimedia equipment be fully integrated into California's schools so that they are available when and where they are needed to improve learning This will provide tools for effectively presenting course materials, as well as resources for helping students learn how to access, analyze, and interpret information and how to communicate their findings

TIMELINE → ONGOING

RECOMMENDATION #9

Students should have comparable access to information technology Efforts should be pursued to meet this goal, such as 'take-home computer" programs and extended school and library hours allowing access to technology

TIMELINE → ONGOING"

RECOMMENDATION #10

The State's adoption system for instructional materials, which was established to evaluate the quality and appropriateness of textbooks and other printed materials for use in schools, should be modified to provide effective evaluation of technology-based instructional materials and support their submission

TIMELINE → SEPTEMBER 1995

RECOMMENDATION #11

The Commission on Teacher Credentialing, working with California State University (CSU), should establish rigorous standards for teacher competency in computer-based applications and their effective use in the classroom By the Fall of 1997, new teachers should only be certified if they have met the new standards, while a plan should be implemented for in-service training of current teachers Additionally, methods to gauge the performance of new learning methods should be established with successful techniques expanded and unsuccessful programs eliminated

TIMELINE → NEW TEACHERS. SEPTEMBER 1997 ALL TEACHERS PHASED IN BY 2000

RECOMMENDATION #12

The California State University System should establish a Center for Technology-Based Learning at the new campus at Monterey The Center should (a) provide training and support for teachers, (b) develop systems to measure the effectiveness of learning from re-engineered and technology-enhanced methods *versus* current methods, (c) develop methods to increase parental involvement, (d) test technology, (e) work with private industry on research and development of teaching techniques, software, and courseware for K-12, post-secondary, and lifelong-learning students, (f) disseminate information to teachers, administrators, and parents information about the use of information technology (g) promote results-oriented approaches and other techniques that provide efficiencies, and (h) promote the use of distance-learning and other techniques to provide access for California State University Monterey students to courses at other CSU facilities

TIMELINE → ONGOING

RECOMMENDATION #13

California's public college and university systems should convene a summit and maintain an ongoing effort to

- Achieve efficiency gains, reduce course overlap, enhance value to students, promote distance learning opportunities for students across systems, and consolidate "regular" and "extension" curricula — and determine how information technology can help, and

  TIMELINE → 120 DAYS

- Reach a consensus on providing "lifelong learning" needed by California's workers

  TIMELINE → 120 DAYS

RECOMMENDATION #14

In order to promote cost effective lifelong learning at state colleges and universities, as well as maximize their benefits for all Californians, school facilities should provide after-school educational opportunities and access to information resources for enrolled students and all other members of the community

TIMELINE → ONGOING

RECOMMENDATION #15

School administrators should promote ongoing, multiple use of their facilities by all members of the community for educational opportunities and access to information resources. Use of existing facilities in the communities which they serve — such as high-schools, office buildings, and libraries that have available information technology resources — as an alternative to obtaining new facilities, should be considered. Use of school facilities to provide after-school educational opportunities and access to information resources for enrolled students and all other members of the community should be encouraged.

TIMELINE → ONGOING

RECOMMENDATION #16

In order to promote the development of virtual and local communities of interest, the State Librarian and the Superintendent of Public Instruction should

- Develop and fund a targeted grant program to support extended hours at public schools and libraries, and

   TIMELINE → JULY 1995

- Work with the Public Utilities Commission to seek federal authority to use Universal Service Funds to support the grant program, so that (a) the utilization of "scarce" information technology is maximized for the benefit of all members of the immediate community, (b) all Californians are provided with opportunities to communicate with each other regardless of geography, and (c) Californians who cannot afford it can have practical access to advanced network services in fulfillment of the State's commitment to 'universal access.'

   TIMELINE → 30 DAYS

RECOMMENDATION #17

In order to test the ability of information technology to increase parental involvement in their children's education, the Council recommends the funding of voice-mail and e-mail pilot projects in order to increase the communication between parents-teachers-students. While voice-mail systems may be most economically arranged through private service providers, the cost of providing terminals and communications equipment for the e-mail tests make them feasible only with donated equipment.[iii]

TIMELINE → FALL 1995

RECOMMENDATION #18

In order to reduce both the costs and risks of information technology, help ensure its effective use, and lessen the burden of non-core responsibilities, California's schools, colleges, and universities should establish

- A preference for performance-based procurement of information technology,

- A general preference for utilizing private-sector service providers to maintain and support information technology systems to the extent that this would be cost-effective and minimize risks, in order to relieve school administrators and teachers of responsibilities that interfere with their primary charge,[iv] and

Call on the California congressional delegation to support passage of legislation authorizing each state to eliminate entry barriers and other harmful regulations affecting any intrastate telecommunications market — or, at a minimum, provide such authorization to California to do so

TIMELINE → 30 DAYS

- In recognition of the relationships among all intrastate telecommunications markets — with regard to competition both for customers and capital — urge all state and federal governmental entities to expedite their deregulation of these markets

TIMELINE → 30 DAYS

- Establish a presumption in favor of state agencies and educational institutions obtaining all telecommunications services from commercial providers — subject to (a) the needs of law enforcement and emergency services agencies, and emergency functions that cannot be provided by private firms, or (b) waiver by the Secretary of State and Consumer Services, based on a full assessment of costs and risks

TIMELINE → 30 DAYS

- Require the divestment of telecommunications systems presently owned or operated by a state agency or university, except those exempted above, at the earliest practicable time

TIMELINE → TBA

Notes

I   This function is explicitly to be performed at the agency not department level
II See also Recommendation #17
III The Detwiler Foundation based in San Diego has been a leader in California in bringing donated computers into the classroom At the request of the Council the Foundtion is developing a plan to provide computer equipment for students and parents to take home inorder to provide additional test sites ror using e-mail to promote parental involvement
IV This recommendation is most significant for K-12, which generally does not have significant computer science departments as do colleges and universities
V   This recommendation which encompasses the Council's decision not to support the proposed GSEN system will also have the benefit of supporting modernization of public network facilities This approach has been used successfully by Nebraska and North Carolina to promote expedited deployment of modern facilities
VI The California Department of General Services has established a basic program with the Detwiler Foundation whereby the State retains title to the equipment while the Foundation guides its refurbishment and placement in the schools

- A presumption in favor of private-sector providers of telecommunications services '

RECOMMENDATION #19

The Governor should

- Call on private businesses and foundations to expand their computer-donation programs, as well as enhance them by setting standards for minimum system requirements and working condition of equipment, by making the donations predictable and with significant advance notice, and by making a long-term commitment — with a goal of 500,000 computers for education by the year 2000,

- Establish a comprehensive program for the donation of computer equipment by state agencies to public schools ¹

- Work with school administrators to ensure that donated equipment is used as "appropriate technology' for classroom applications that do not require more advanced technology, i e , that it is not used to substitute for more advanced technology that is considered essential to a particular curriculum or as a platform for new educational courseware

RECOMMENDATION #20

In order to expedite the development of competitive, low-cost, high-quality telecommunications markets in the state the Governor should

- Work with the California Public Utilities Commission (CPUC) to implement the plan it published in November, 1993 to eliminate impediments to competition in the state's tele-communications markets, with a goal of eliminating entry barriers and other anti-competitive, anticonsumer constraints in all telecommunications markets by the end of 1995 Specific steps include

  Review current state regulations and statutes for those that inhibit competition, and promote their modification or repeal,

  Urge the U S Department of Justice to use its own authority, as well as petition U S Judge Greene, to end the federal regulation of telephone markets within California, and

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CALIFORNIA POSTSECONDARY EDUCATION COMMISSION

THE California Postsecondary Education Commission is a citizen board established in 1974 by the Legislature and Governor to coordinate the efforts of California's colleges and universities and to provide independent, non-partisan policy analysis and recommendations to the Governor and Legislature

Members of the Commission

The Commission consists of 17 members Nine represent the general public, with three each appointed for six-year terms by the Governor, the Senate Rules Committee, and the Speaker of the Assembly Six others represent the major segments of postsecondary education in California Two student members are appointed by the Governor

As of September 1996, the Commissioners representing the general public are

Jeff Marston, San Diego, *Chair*
Vacant, *Vice Chair*
Elaine Alquist, Santa Clara
Mim Andelson, Los Angeles
Henry Der, San Francisco
Lance Izumi, San Francisco
Kyo "Paul" Jhin, Malibu
Guillermo Rodriguez, Jr , San Francisco
Melinda G Wilson, Torrance

Representatives of the segments are

David S Lee, Santa Clara, appointed by the Regents of the University of California,

Gerti Thomas, Albany, appointed by the California State Board of Education,

Philip E del Campo, LaMesa, appointed by the Board of Governors of the California Community Colleges,

Ted J Saenger, San Francisco, appointed by the Trustees of the California State University,

Kyhl Smeby, Pasadena, appointed by the Governor to represent California's independent colleges and universities, and

Frank R Martinez, San Luis Obispo, appointed by the Council for Private Postsecondary and Vocational Education

The two student representatives are
Stephen R McShane, San Luis Obispo
John E Stratman, Jr , Orange

Functions of the Commission

The Commission is charged by the Legislature and Governor to "assure the effective utilization of public postsecondary education resources, thereby eliminating waste and unnecessary duplication, and to promote diversity, innovation, and responsiveness to student and societal needs "

To this end, the Commission conducts independent reviews of matters affecting the 2,600 institutions of postsecondary education in California, including community colleges, four-year colleges, universities, and professional and occupational schools

As an advisory body to the Legislature and Governor, the Commission does not govern or administer any institutions, nor does it approve, authorize, or accredit any of them Instead, it performs its specific duties of planning, evaluation, and coordination by cooperating with other State agencies and non-governmental groups that perform those other governing, administrative, and assessment functions

Operation of the Commission

The Commission holds regular meetings throughout the year at which it debates and takes action on staff studies and takes positions on proposed legislation affecting education beyond the high school in California By law, its meetings are open to the public Requests to speak at a meeting may be made by writing the Commission in advance or by submitting a request before the start of the meeting

The Commission's day-to-day work is carried out by its staff in Sacramento, under the guidance of Executive Director Warren Halsey Fox, Ph D , who is appointed by the Commission

Further information about the Commission and its publications may be obtained from the Commission offices at 1303 J Street, Suite 500, Sacramento, California 98514-2938, telephone (916) 445-7933

MOVING FORWARD: A Preliminary Discussion of Technology and Transformation in California Higher Education

Commission Report 96-6